

WHAT IS CLAIMED IS:

1. A prosthetic intervertebral disc comprising:

5 top and bottom endplates; and

a fibrous compressible element positioned between said top and bottom endplates, wherein said compressible element has a configuration that includes an annular region and a nuclear region;

10 wherein said top and bottom end plates are held together by at least one fiber wound around at least one region of said top end plate and at least one region of said bottom end plate.

15 2. The prosthetic intervertebral disc according to Claim 1, wherein said top and bottom endplates comprise mating surfaces for interfacing with upper and lower vertebral body fixation elements.

20 3. The prosthetic intervertebral disc according to Claim 1, wherein said top and bottom endplates further comprise integrated upper and lower vertebral body fixation elements.

25 4. The prosthetic intervertebral disc according to Claim 1, wherein said top and bottom endplates each comprise a plurality of peripheral slots through which one or more fibers of said fibrous compressible element pass through to hold said top and bottom end plates together.

25 5. The prosthetic intervertebral disc according to Claim 4, wherein said fibrous compressible element comprises a fibrous component that is limited to said annular region.

6. The prosthetic intervertebral disc according to Claim 4, wherein said fibrous compressible element comprises a fibrous component that extends into at least a portion of said nuclear region.

5 7. The prosthetic intervertebral disc according to Claim 4, wherein said fibrous compressible element comprises a fiber winding pattern that includes at least a component which is oblique with respect to the planar surfaces of the top and bottom plates.

10 8. The prosthetic intervertebral disc according to Claim 7, wherein said fiber winding pattern further includes a component that is horizontal or vertical with respect to the planar surfaces of the top and bottom plates.

15 9. The prosthetic intervertebral disc according to Claim 7, wherein said fibrous compressible element further comprises a three-dimensional woven fabric component.

10. The prosthetic intervertebral disc according to Claim 1, wherein said fibrous compressible element further comprises at least one polymeric component.

20 11. The prosthetic intervertebral disc according to Claim 10, wherein said at least one polymeric component is impregnated with fibers of said fibrous compressible element.

25 12. The prosthetic intervertebral disc according to Claim 10, wherein said at least one polymeric component is not impregnated with fibers of said fibrous compressible element.

30 13. The prosthetic intervertebral disc according to Claim 10, wherein said at least one polymeric component is present in said nucleus region.

14. The prosthetic intervertebral disc according to Claim 10, wherein said at least one polymeric component is present in said annular region.

15. The prosthetic intervertebral disc according to Claim 10, wherein said disc 5 comprises at least two different polymeric components.

16. A system for replacing an intervertebral disc with a prosthetic intervertebral disc, said system comprising:

(a) a prosthetic intervertebral disc comprising:

10 (i) top and bottom endplates; and
(ii) a fibrous compressible element positioned between said top and bottom endplates, wherein said compressible element has a configuration that includes an annular region and a nuclear region;

15 wherein said top and bottom end plates are held together by at least one fiber wound around at least one region of said top end plate and at least one region of said bottom end plate; and

(b) at least one of:

20 (i) upper and lower vertebral body fixation elements that mate respectively with said top and bottom endplates; and
(ii) a disc delivery device.

17. The system according to Claim 16, wherein said system comprises said upper and lower vertebral body fixation elements.

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18. The system according to Claim 17, wherein each of said upper and lower vertebral body fixation elements is a rigid plate that includes at least one protrusion for extending into a cortical bone region of a vertebral body.

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19. The system according to claim 18, wherein each of said rigid plates further includes a porous surface for promoting bone ingrowth into said plates.

20. The system according to Claim 18, wherein each of said rigid plates further includes a geared interface for mating with said top and bottom endplates in a manner that provides for one-way horizontal movement during mating.

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21. The system according to Claim 20, wherein each of said rigid plates further includes an interface for mating with said disc top or bottom endplates in a manner that provides for no vertical movement after mating.

10 22. The system according to Claim 18, wherein each of said rigid plates further includes one or more open spaces that provide for elastic deformation of said plates upon mating with said disc top or bottom endplates.

15 23. A kit for use in replacing an intervertebral disc with a prosthetic intervertebral disc, said kit comprising:

20 (a) a prosthetic intervertebral disc comprising:
(i) top and bottom endplates; and
(ii) a fibrous compressible element positioned between said top and bottom endplates, wherein said compressible element has a configuration that includes an annular region and a nuclear region;
wherein said top and bottom end plates are held together by at least one fiber wound around at least one region of said top end plate and at least one region of said bottom end plate; and

25 (b) instructions for using said prosthetic intervertebral disc.

24. The kit according to Claim 23, wherein said top and bottom plates comprise mating surfaces for interfacing with upper and lower vertebral body fixation elements.

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25. The kit according to Claim 24, wherein said kit further comprises upper and lower vertebral body fixation elements.

26. The kit according to Claim 25, wherein each of said upper and lower vertebral
5 body fixation elements is a rigid plate that includes at least one protrusion for
extending into a cortical bone region of a vertebral body.

27. The kit according to Claim 26, wherein said fixation elements include multiple
protrusion elements.

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28. The kit according to Claim 27, wherein each of said rigid plates further
includes a porous surface for promoting bone ingrowth into said plates.

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29. The kit according to Claim 27, wherein each of said rigid plates further
includes a geared interface for mating with said disc top and bottom endplates in a
manner that provides for one-way horizontal movement during mating.

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30. The kit according to Claim 27, wherein each of said rigid plates further
includes an interface for mating with said disc top or bottom endplates in a manner
that provides for no vertical movement after mating.

31. The kit according to Claim 27, wherein each of said rigid plates further
includes one or more open spaces that provide for elastic deformation of said plates
upon mating with said disc top or bottom endplates.

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32. The kit according to Claim 23, wherein said top and bottom endplates further
comprise integrated upper and lower vertebral body fixation elements.

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33. The kit according to Claim 32, wherein said kit further comprises bone
screws.

34. The kit according to Claim 23, wherein said top and bottom endplates each comprise a plurality of peripheral slots through which one or more fibers of said fibrous compressible element pass through to hold said top and bottom end plates together.

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35. The kit according to Claim 34, wherein said fibrous compressible element comprises a fibrous component that is limited to said annular region.

36. The kit according to Claim 34, wherein said fibrous compressible element
10 comprises a fibrous component that extends into at least a portion of said nucleus region.

37. The kit according to Claim 34, wherein said fibrous compressible element
comprises a fiber winding pattern that includes at least a component which is oblique
15 with respect to the planar surfaces of the top and bottom endplates.

38. The kit according to Claim 37, wherein said fiber winding pattern further
includes a component that is horizontal or vertical with respect to the planar surfaces
of the top and bottom endplates.

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39. The kit according to Claim 38, wherein said fibrous compressible element
comprises a three-dimensional woven fabric element.

40. The kit according to Claim 23, wherein said fibrous compressible element
25 comprises at least one polymeric component.

41. The kit according to Claim 40, wherein said at least one polymeric component
is impregnated with fibers of said fibrous compressible element.

30 42. The kit according to Claim 40, wherein said at least one polymeric component
is not impregnated with fibers of said fibrous compressible element.

43. The kit according to Claim 40, wherein said at least one polymeric component is present in said nuclear region.

5 44. The kit according to Claim 40, wherein said at least one polymeric component is present in said annular region.

45. The kit according to Claim 40, wherein said disc comprises at least two different polymeric components.

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46. The kit according to Claim 23, wherein said kit further comprises an intervertebral disc implantation device.

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47. A method for replacing a intervertebral disc with a prosthetic intervertebral disc, said method comprising:

(a) removing an intervertebral disc from a subject to produce a void disc space; and

(b) implanting into said void disc space a prosthetic intervertebral disc comprising:

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(i) top and bottom endplates; and

(ii) a fibrous compressible element positioned between said top and bottom endplates, wherein said compressible element has a configuration that includes an annular region and a nuclear region;

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wherein said top and bottom end plates are held together by at least one fiber wound around at least one region of said top end plate and at least one region of said bottom end plate.

48. The method according to Claim 47, wherein an implantation device is 30 employed to implant said prosthetic intervertebral disc into said void disc space.